tinguish from the main ideas. A few important concepts are not explained, like Lanczos' process and Arnoldi's method, though used in the book. To conclude, I really recommend this book because of its comprehensive and compact discussion to anybody who wishes to know how to solve linear systems by iterative methods, on vector and parallel computers.

K. Meerbergen

Fast Algorithms: A Multitape Turing Machine Implementation

Arnold Schönhage, Andreas F. W. Grotefeld and Ekkehart Vetter

B.I. Wissenschaftsverlag, Dudenstraße 6, Postfach 100311, 6800 Mannheim 1, Germany, 1994, 297 pages with 24 illustrations and 5 tables, ISBN 3-411-16891-9, Hardcover, DM 68.

This book describes an efficient implementation of a large number of multi-precision algorithms for computing with integers, rational numbers, real or complex numbers and univariate polynomials.

Part I presents the basic ideas, the data structures for encoding multi-precision data, and discusses some basic algorithms for long integers (from negation to Karatsuba multiplication and fast multiplication modulo (2^N+1)). Also a hypothetical computing model TP (Turing Processor) that combines the theoretical structure of a multitape Turing machine with the common features of a RISC processor is introduced. All the multi-precision algorithms have been implemented in the TP assembly language TPAL for which a complete reference manual is given. Many examples illustrate the programming techniques that are needed for writing efficient TPAL routines, and exercises of varying difficulty are included.

Part II concerns several implementations of this TP model on SUN workstations and other systems. There is a rather portable version that proceeds by first translating a TPAL program into a C program. Guidelines to port this TPAL compiler to other machines are given. There is also an earlier SUN-3 version by means of a direct emulation of TP on the MC 68030 microprocessor, offering several extra features for tracing and debugging, also with easy links to C. Turing programs can call C functions and a Turing processor can be invoked from within a C program.

Part III discusses the precise interfaces of about 160 routines for multi-precision computations. Additional comments for the proper use and about typical running times are included. Most of these routines are asymptotically fast, like gcd computations, multiplication of real or complex numbers or polynomials, but some of them are also considerably faster than other standard implementations even for operands of moderate size, like dividing complex numbers or taking square roots.

Further extensions of this software are under way. In fact, all these routines are prerequisite steps towards the main goal of an efficient implementation of the first author's "splitting circle method" for computing the roots of complex polynomials.

This book is very well written and completely self-contained. It succeeds in being at the same time a textbook, a research report, a reference manual and a programmer's guide. I recommend it to anyone interested in implementation aspects of fast multi-precision algorithms.

P. Kravanja

Digital Video Processing

A. Murat Tekalp

Prentice-Hall signal processing series, Prentice Hall PTR, 1995, xxii + 526 pages, ISBN 0-13-190075-7.

This book covers many issues in the field of digital image and video processing, ranging from image acquisition over image restoration to video compression techniques using motion estimation.
It contains 25 chapters, divided in six parts, and 3 appendices. Every chapter is concluded with some exercises and a bibliography.
The first part gives the mathematical representation and properties of digital images and video. This allows to describe the various image processing operations from a mathematical view later.
The second and third part are devoted to two-dimensional respectively three-dimensional motion estimation using deterministic and statistical methods. It also includes the segmentation into separate moving objects by processing of the es-